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First records of *Epinephelus coeruleopunctatus* (Bloch, 1790), Whitespotted Grouper, (Teleostei, Epinephelidae) in the southern Arabian Gulf

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Abstract

Two individuals of *Epinephelus coeruleopunctatus* (Bloch, 1790), Whitespotted Grouper, were recorded in an offshore marine protected area of the United Arab Emirates on the Arabian Gulf coast at depths of 5 m and 10 m. These are the first records of the species in the southern Arabian Gulf, and they add this species to the few groupers that inhabit one of the most extreme environmental waters of the world.

Keywords

Marine Protected Areas, United Arab Emirates, fish, reef, marine, fisheries

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Introduction

Groupers (family Epinephelidae) are an assemblage of primarily reef fishes found throughout the tropics and subtropics of the world's oceans. There are currently more than 160 species of grouper described with the greatest diversity found in the Indo-Pacific (Craig et al. 2011), but with only 10 species recorded in the Arabian Gulf (Grandcourt 2012). While primarily reef-associated, some groupers are semi-pelagic (e.g., *Cephalopholis colonus* (Valenciennes, 1846) and *C. furcifer* (Valenciennes, 1828)), and some live on mud flats, silty bottoms, or submarginal reefs (e.g., *Epinephelus bontoides* (Bleeker, 1855)). Among those where information on reproductive biology is available, there are many grouper species that are protogynous hermaphrodites, while others are gonochoristic and do not change sex (see species accounts by Craig et al. 2011). Groupers are highly prized food fishes and sustain several large fisheries around the globe.

Epinephelus coeruleopunctatus (Bloch, 1790), Whitespotted Grouper, is widely distributed in the Indo-Pacific (Fennessy 2018). In the Arabian Gulf, it has been recorded in the northwestern countries (Saudi Arabia, Kuwait, and Bahrain; Bouwmeester et al. 2010), where the environmental conditions are less extreme than in the

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southern Gulf (Fig.1). This species has not been recorded in the annual statistical reports of the United Arab Emirates (UAE) from 2001–2012, nor is it recorded for the UAE in the review on fish and fisheries of the Arabian Gulf by Grandcourt (2012) and Fennessi (2018). *Epinephelus coeruleopunctatus* is classified by the IUCN Red List as Least Concern due to the absence of detection of the population declines globally with a recommendation for research on its life history parameters as well as improvements in fishery monitoring. This solitary species is naturally uncommon throughout much of its range and occurs in rocky or coral-rich areas of deep lagoons, channels, and outer reef slopes, usually in or near caves (Craig et al. 2011). *Epinephelus coeruleopunctatus* feeds on fish and crustaceans (Anderson and Hafiz, 1987) and can grow up to 76 cm long (Grant et al. 1982). It is exploited by artisanal, small-scale, and large-scale fisheries in much of its range and is targeted with other groupers by the live reef food fish trade (LRFFT; Sadovy and Liu, 2006). *Epinephelus coeruleopunctatus* can be seen in the fish markets of the Arabian Gulf region and is sold together with other common commercial groupers (pers. obs.).

Methods

During a scientific scuba dive to study coral reef cover and health, two individuals of *Epinephelus coeruleopunctatus* were identified and measured visually by scientists with more than 15 years of experience estimating fish size underwater. The individuals were recorded in the northern portion of Sir Bu Nair Marine Protected Area on 29 September 2019 and 10 October 2021. Sir Bu Nair is an offshore island in the southern Arabian Gulf located 70 km off the United Arab Emirates coastline (Fig. 1). This Marine Protected Area has strict access control, and no fishing is allowed within 1 nautical mile around the island. Research and diving activities in Sir Bu Nair Marine Protected Area are restricted and finding new records during field surveys is not uncommon.

Results

Epinephelus coeruleopunctatus (Bloch, 1790)

New records. UNITED ARAB EMIRATES – **Sharjah** • Sir Bu Nair Island, southwest shore; 25°13′03.04″N, 054°12′21.79″E; 5 m depth; 29.IX.2019; D. Mateos-Molina obs. • same locality, northern; 25°15′21.29″N, 054°12′49.42″E; 10 m depth 10.X.2021; I. Bejarano obs.

The individual observed in 2019 was observed in a dense coral stand dominated by *Acropora downingi* Wallace, 1999 at a depth of 5 m. In 2021, a second individual was recorded at 10 m depth in a more diverse and less structurally complex coral area sheltering between colonies of *Acropora* spp. This latter fish was identified and photographed by D. Mateos-Molina (Fig. 2). The estimated size of the specimen based on the photograph and the divers' estimation was approximately 40 cm in total length, which indicates an adult life stage.

Identification. The two specimens of *E. coeruleopunctatus* were observed and photographed in the field and compared with published photographs and descriptions (Randall and Ben-Tuvia 1983; Heemstra and Randall 1993; Craig et al. 2011). The species is distinguishable from all other groupers in the Arabian Gulf in having a brownish-grey body covered with small pale spots overlain with large white blotches, an oblique black saddle on the rear half of the caudal peduncle, four or five indistinct black blotches at the base of the dorsal fin, a prominent black streak on the maxillary groove, and a comparatively long head length. There are three other grouper species that are superficially similar to *E. coeruleopunctatus* (*E. corallicola* (Valenciennes, 1828), *E. ongus* (Bloch, 1790), and *E. summana* (Forsskål, 1775)). *Epinephelus corallicola* is a western Pacific species that has never been recorded in the Indian Ocean and lacks the prominent pale blotches in *E. coeruleopunctatus*. *Epinephelus ongus* lacks the oblique black saddle on the caudal peduncle and the body is covered in small, cream to white spots lacking in *E. coeruleopunctatus*. *Epinephlus summana* is only known from the Red Sea and has numerous white spots on the anal fin lacking in *E. coeruleoopunctatus*.

Discussion

This note reports the first record of *Epinephlus coeruleopunctatus*, Whitespotted Grouper, in the waters of the southern Arabian Gulf.

Compared with other Indo-Pacific regions, the Arabian Gulf has a relatively low species richness of fishes due to its extreme environmental constraints on adult fishes and larval supply (Coles 2003; Feary et al. 2010). The southern Arabian Gulf presents some of the harshest conditions for reef fish in the world and the harshest in the Arabian Gulf due to its shallow depth which generates extreme seasonal temperatures (summer SSTs >36 °C and winter minima of <12 °C) and high salinity (averaging 42 ppt), particularly in shallow waters (Coles 2003; Sheppard et al. 2010; Riegl and Purkis 2012). *Epinephelus coeruleopunctatus* is not common in the Arabian Gulf, but it has been reported in the northwestern countries of the Arabian Gulf where environmental conditions are less severe than in the southern portions (Moradi and Kabiri 2015). The species is reported in Kuwait (Carpenter et al. 1997), Bahrain (Smith and Saleh 1987), Saudi Arabia (FAO landing statistics between 2010–2014), and Iraq (Almukhtar et al. 2012). In the southern Arabian Gulf, however, this species has never been observed in the UAE, Qatar, or Iran (Grandcourt 2012; Fennessi 2018; Bouwmeester et al. 2020; Robert Myers pers. comm). *Epinephelus coeruleopunctatus* has not been reported at Sir Bu Nair island (EMEG 2012) until now. This finding could imply the potential of this species to survive in extreme environmental conditions.

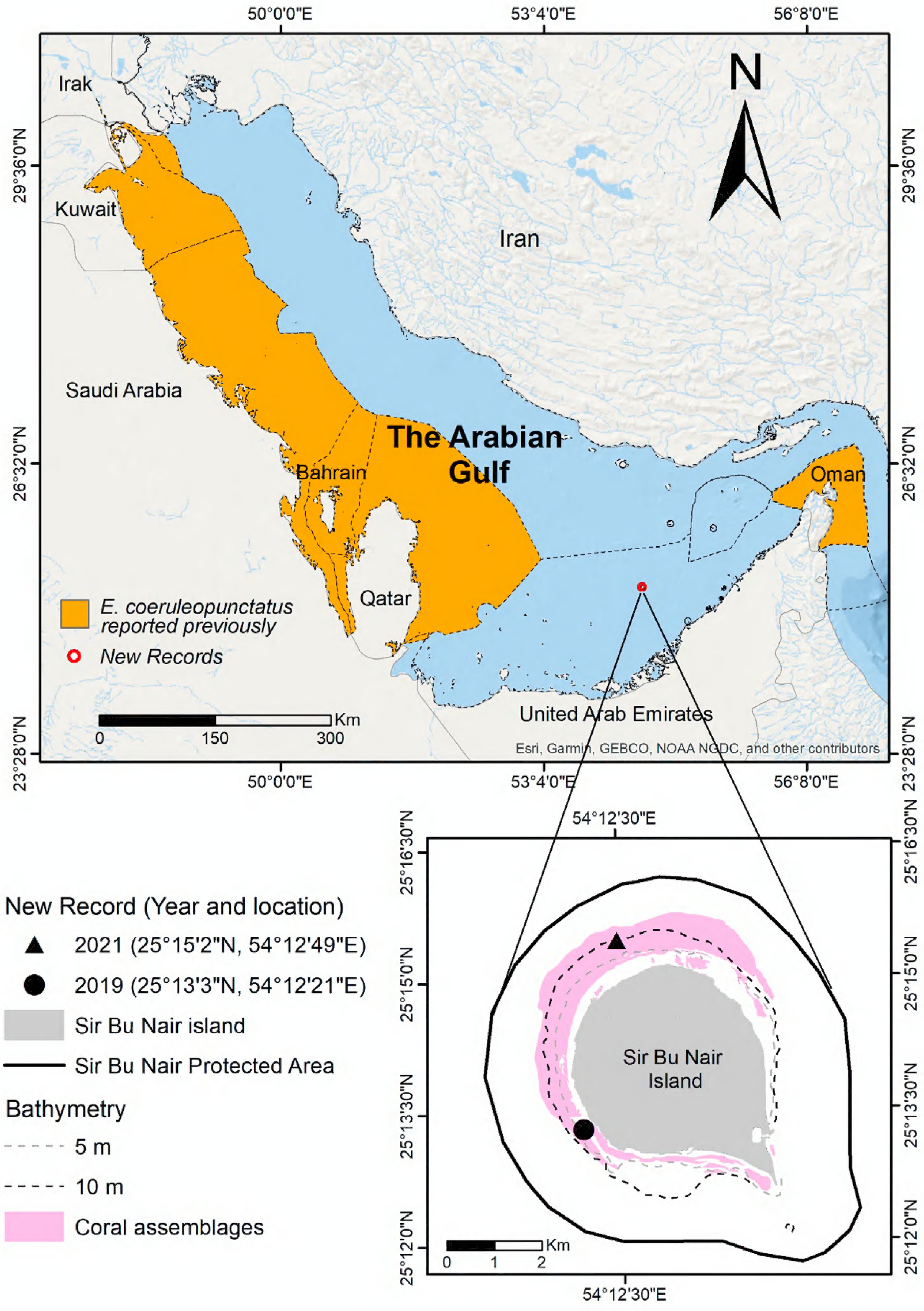

Figure 1. Map showing the countries where *Epinephelus coeruleopunctatus* has been reported in the Arabian Gulf and the location and country of this new record (Sir Bu Nair Island, United Arab Emirates).

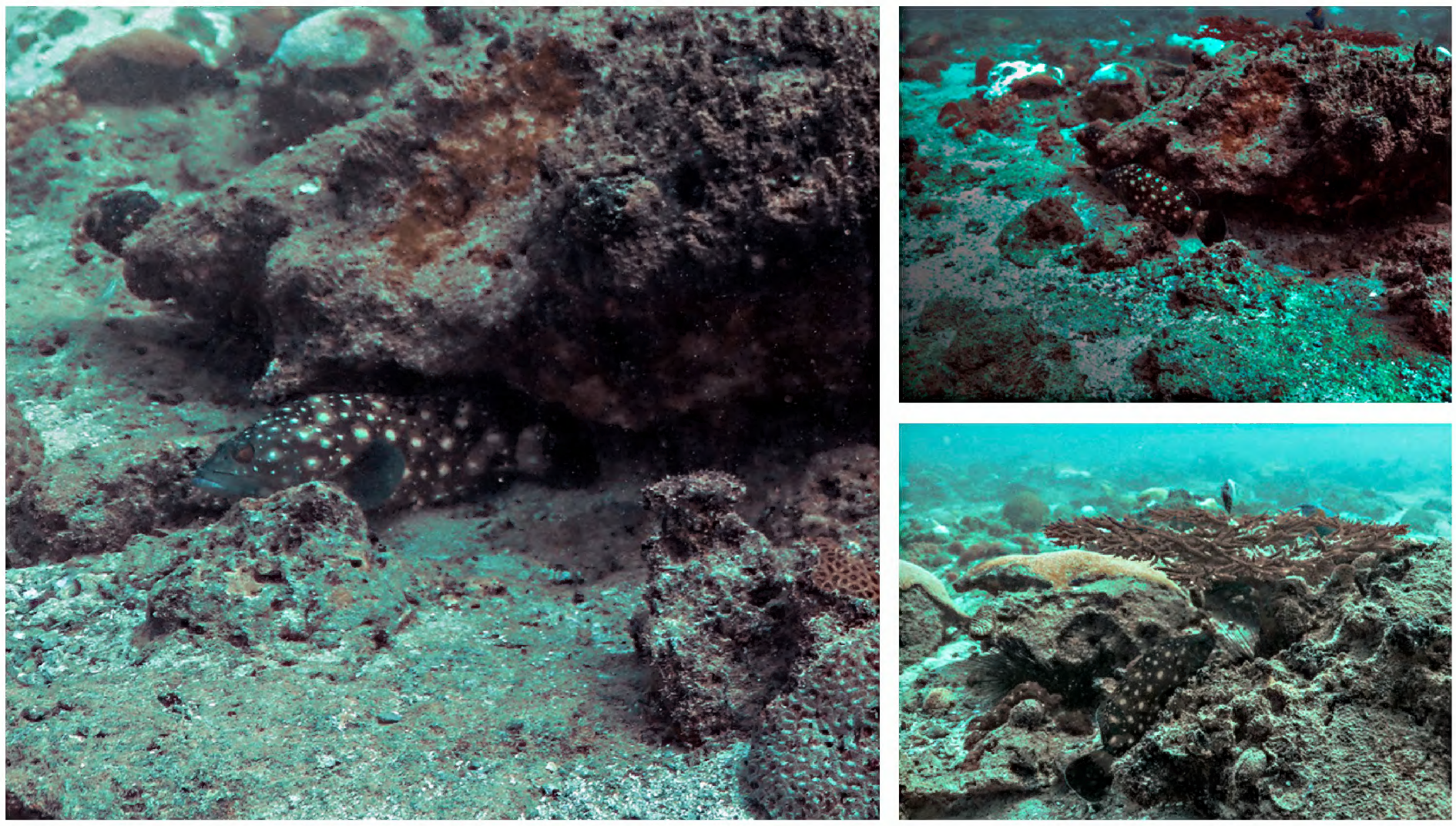

Figure 2. *Epinephelus coeruleopunctatus* was identified and photographed in Sir Bu Nair Marine Protected Area, an offshore island in the southern Arabian Gulf. Photographs by D. Mateos-Molina.

The relatively close location of Sir Bu Nair to the Strait of Hormuz and the presence of *E. coeruleopunctatus* in the Gulf of Oman suggests a key steppingstone role of Sir Bu Nair that allows some fish to connect between these two subregions of the western Indian Ocean marine province despite their distinct oceanography, environment, and biology. This hypothesis has been previously suggested for coral species (Bento et al. 2022) based on the prevalent oceanographic processes at Sir Bu Nair associated with the larger-scale cyclonic circulation flowing from north Qatar towards the Straits of Hormuz and the Gulf of Oman (Cavalcante et al. 2016, 2020; Campos et al. 2020). Therefore, Sir Bu Nair could be playing an important ecological role in the region, potentially serving as a biogeographical stepping stone in this long-range connectivity between the Gulf of Oman and the Arabian Gulf. Further work still needs to be conducted to better understand the role of Sir Bu Nair and other offshore islands as potential steppingstones for coral reef fishes in the region.

In the last two decades, reef fishes in the Arabian Gulf have been deeply affected by overfishing and habitat loss. Coastal development and recurrent coral bleaching and disease events have reduced suitable habitats for coral-dependent fishes throughout the majority of the region (Sale et al. 2011; Riegl and Purkis 2015; Buchanan et al. 2016; Riegl et al. 2018). Sir Bu Nair island is a priority area for biodiversity in the UAE (Ben Lamine et al. 2021), hosting a healthy and structurally complex coral habitat, including the last remaining *Acropora* dominated reefs in the southern Arabian Gulf (Mateos-Molina et al. 2020, 2021; Bejarano et al. 2022). Therefore, considering the loss of coral reef habitats and the intense fisheries activity in the Gulf, the presence of *E. coeruleopunctatus* in Sir Bu Nair waters could be a signal of the potential role that Sir Bu Nair Marine Protected Area could be playing as refugia for this commercial fish species.

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Authors' Contributions

Conceptualization: DMM. Data curation: DMM. Investigation: DMM. Investigation: IB. Methodology: IB. Validation: MTC. Visualization: DMM. Writing – original draft: DMM. Writing – review and editing: IB, MTC.

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